OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **CHALK POND** the program coordinators recommend the following actions.

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *worsening* in-lake chlorophyll-a trend, meaning concentrations are increasing. The increase in September is likely due to the green color noted at that time. There may have been an algae bloom that caused the green color, increased chlorophyll concentrations, and reduced clarity (see below). The average chlorophyll concentration in 2000 was well above the state mean reference line. While algae are present in all lakes, an excess amount of any type is not welcomed. Algal concentrations can increase when there are external and internal sources of phosphorus. Phosphorus is the nutrient that algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *worsening* trend in lake transparency. This year's average was the lowest at the Pond since 1986 and was well below the state mean. The 2000 sampling season was considered wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity. Efforts should be made to stabilize stream banks, lake shorelines, and disturbed soils in the watershed. Guides to Best Management Practices are available from NHDES upon request.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is

the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *varying* trend for the epilimnetic phosphorus levels and a *worsening* trend for phosphorus levels in the hypolimnion, which means levels are increasing. Both layers showed an increase from last year's values, but the averages remained below the state median. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- The Town of Newbury, in cooperation with the Natural Resources Conservation Service and the Sunapee Hills Association, applied for and received a grant from the NHDES Non-Point Source Program's Local Watershed Initiative Grant to improve Best Management Practices (BMPs) in the Chalk Pond watershed, and also to educate the pond residents regarding septic system failures and the corresponding effects on the pond's water quality. The project was planned due to a recent decline in water quality at the pond. This year the pond fell victim to an algae bloom, and a delta has been forming in the pond due to erosion from the surrounding roads. We look forward to helping the Chalk Pond residents complete this project.

- Please remember to contact the VLAP Coordinator this spring to set an appointment for our annual visit. We have not visited Chalk Pond since 1998. It is essential that we test the water for dissolved oxygen levels and collect a plankton sample. The results of these tests are important information to have when the Coordinator is making water quality comments about Chalk Pond. The Coordinator can be reached at (603) 271-2658 or vlap@des.state.nh.us. We look forward to hearing from you soon!

- In-lake conductivity appears to be increasing over the years (Table 6) while the Inlet and Outlet had lower conductivities this year than last year. Conductivity increases often indicate the influence of human activities on surface waters. Septic system leachate, agricultural runoff, iron deposits, and road runoff can all influence conductivity. It would be useful to uncover the reasons for increased conductivity as we continue to monitor the lake. Collecting samples during a rainstorm will help identify the sources of pollution to the lake. For more information contact the VLAP Coordinator at the number above.

- The Inlet had excessively high phosphorus levels in June and July, which contributed to the highest mean phosphorus recorded for the Inlet (Table 8). The field data sheets reflect that there was recent storm activity on both occasions. The June sample was also turbid (Table 11), which would indicate sediment in the water. Increased flow of water over the ground would cause excess nutrients to erode into the Inlet. Again, collecting samples at different areas along the Inlet during a rainstorm could uncover where nutrients are entering the water.

NOTES

- Monitor's Note (6/26/00): Rain last night, heavy.
- Monitor's Note (7/17/00): Recent storm activity.
- Monitor's Note (8/22/00): Recent rains; pond appears to have above-normal turbidity and corresponding decrease in clarity. Water very cloudy. Extra inlet samples-trying to find phosphorus source.
- Monitor's Note (9/18/00): Pond is green. Visibility no more than ½ meter. Inlet has a very large amount of algae growing in the riprap. This is noteworthy since this is not the norm.

USEFUL RESOURCES

Stormwater Management and Erosion and Sediment Control Handbook. NHDES, Rockingham County Conservation District, USDA Natural Resource Conservation Service, 1992. (603) 772-4385.

What Can You Do To Prevent Soil Erosion?, WD-BB-30, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, WD-BB-9, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

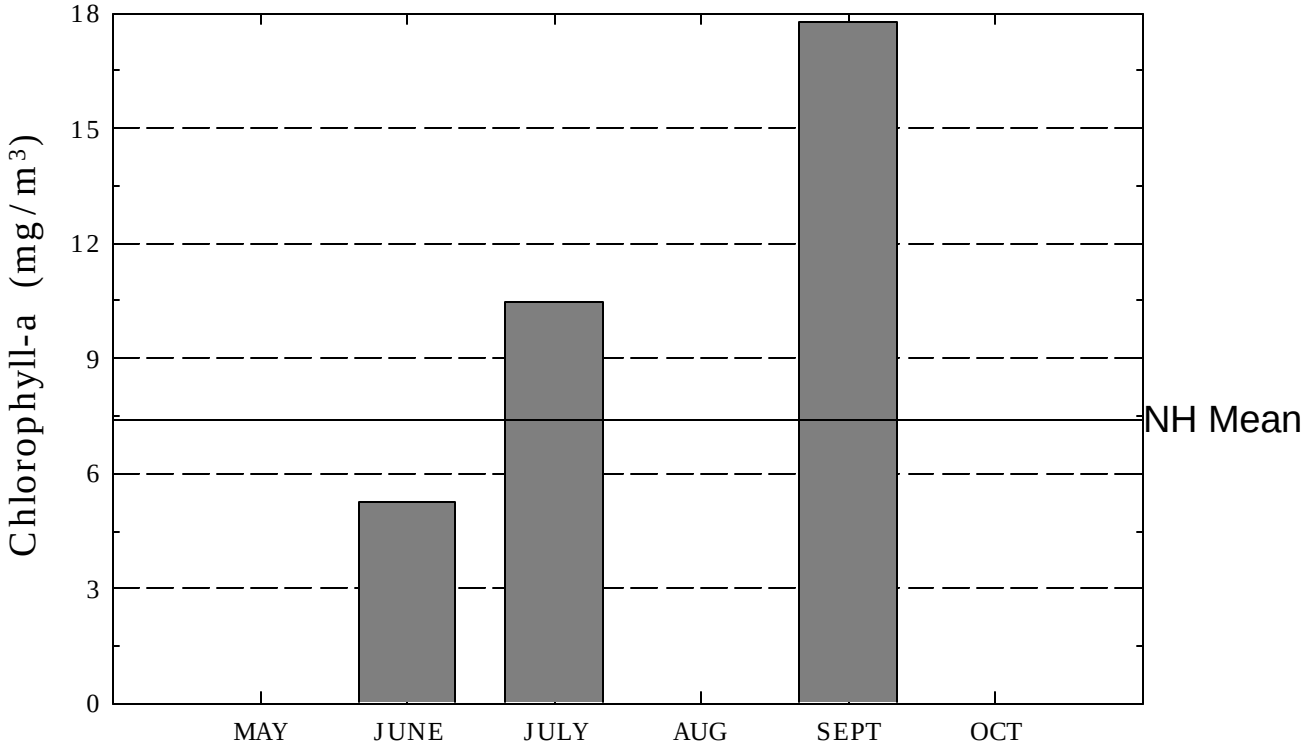
Phosphorus in Lakes, WD-BB-20, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Native or Naturalized Shoreland Plantings for New Hampshire. NHDES Shoreland Protection Program. (603) 271-3503

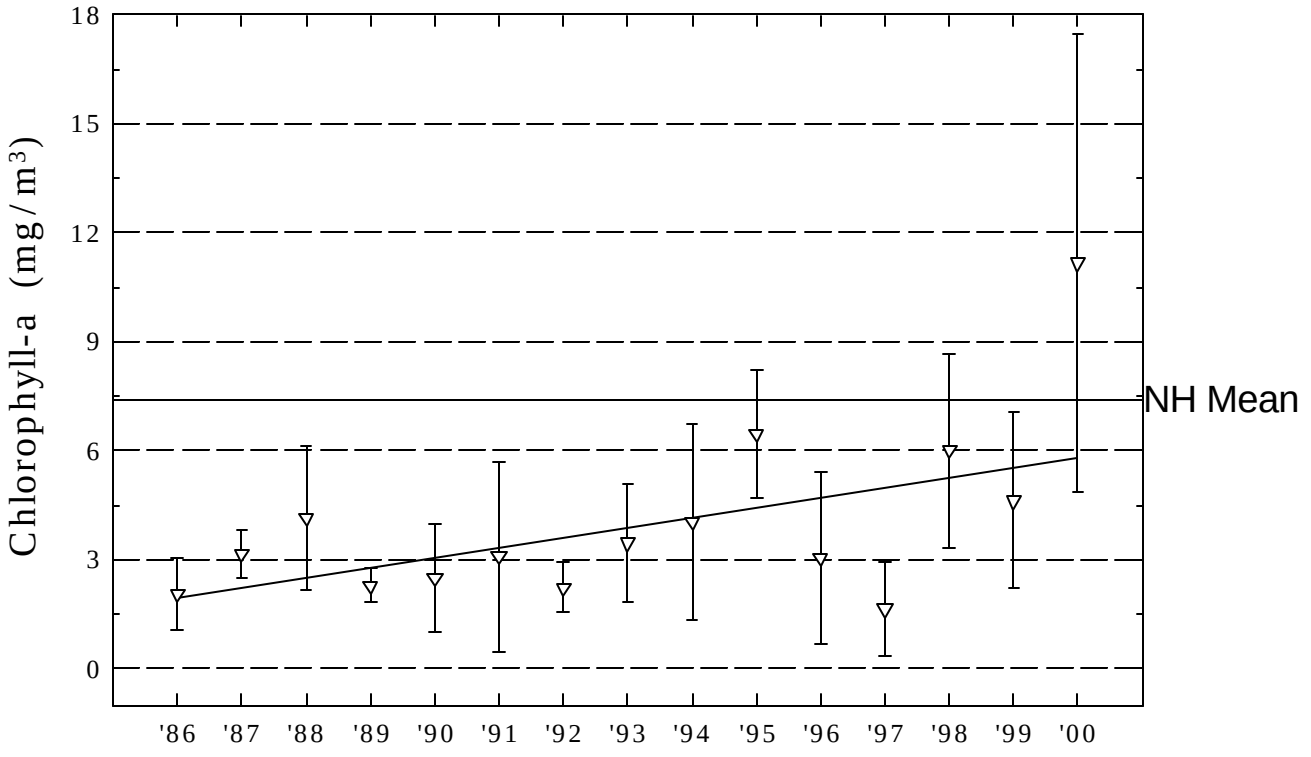
Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, NHDES-WD 97-8, NHDES Booklet, (603) 271-3503

Chalk Pond

Figure 1. Monthly and Historical Chlorophyll-a Results



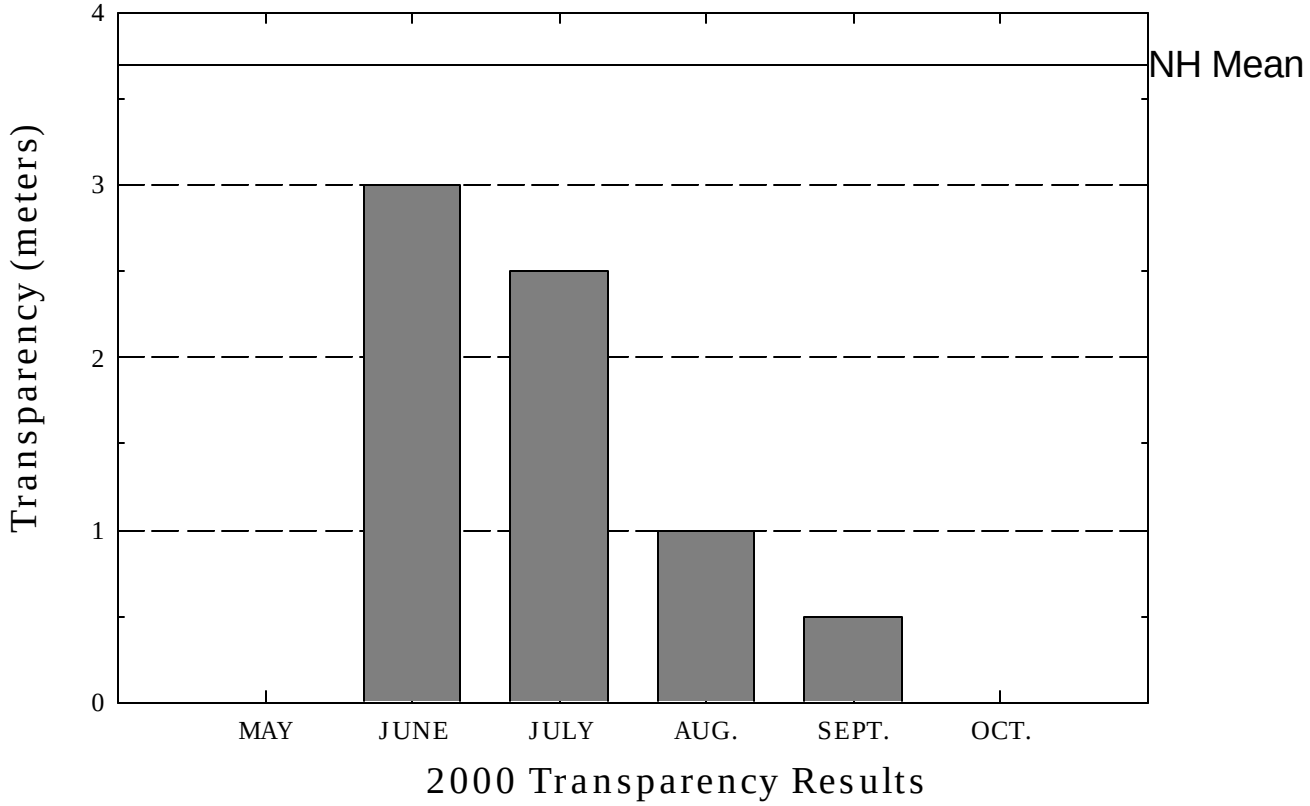
2000 Chlorophyll-a Results

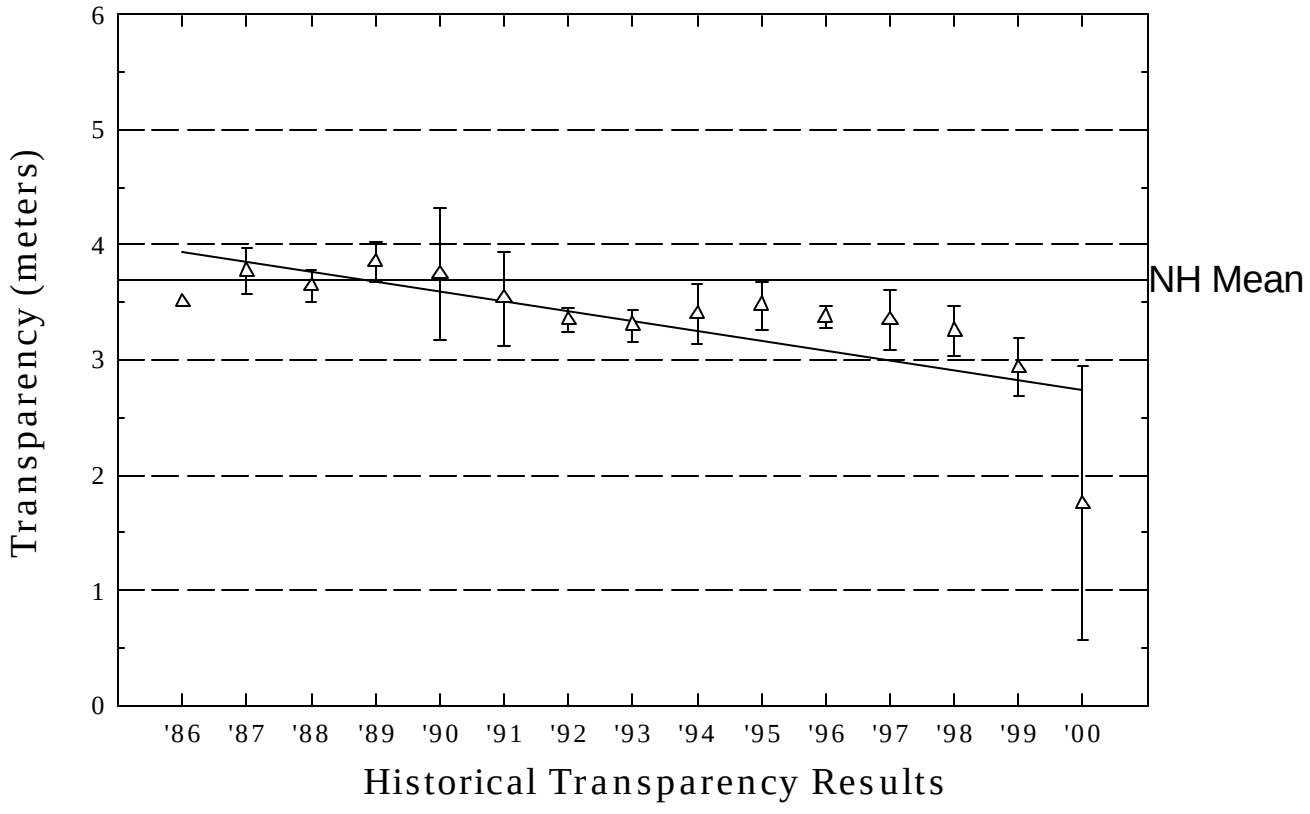


Historical Chlorophyll-a Results

Chalk Pond

Figure 2. Monthly and Historical Transparency Results





Chalk Pond

Figure 3. Monthly and Historical Total Phosphorus Data.

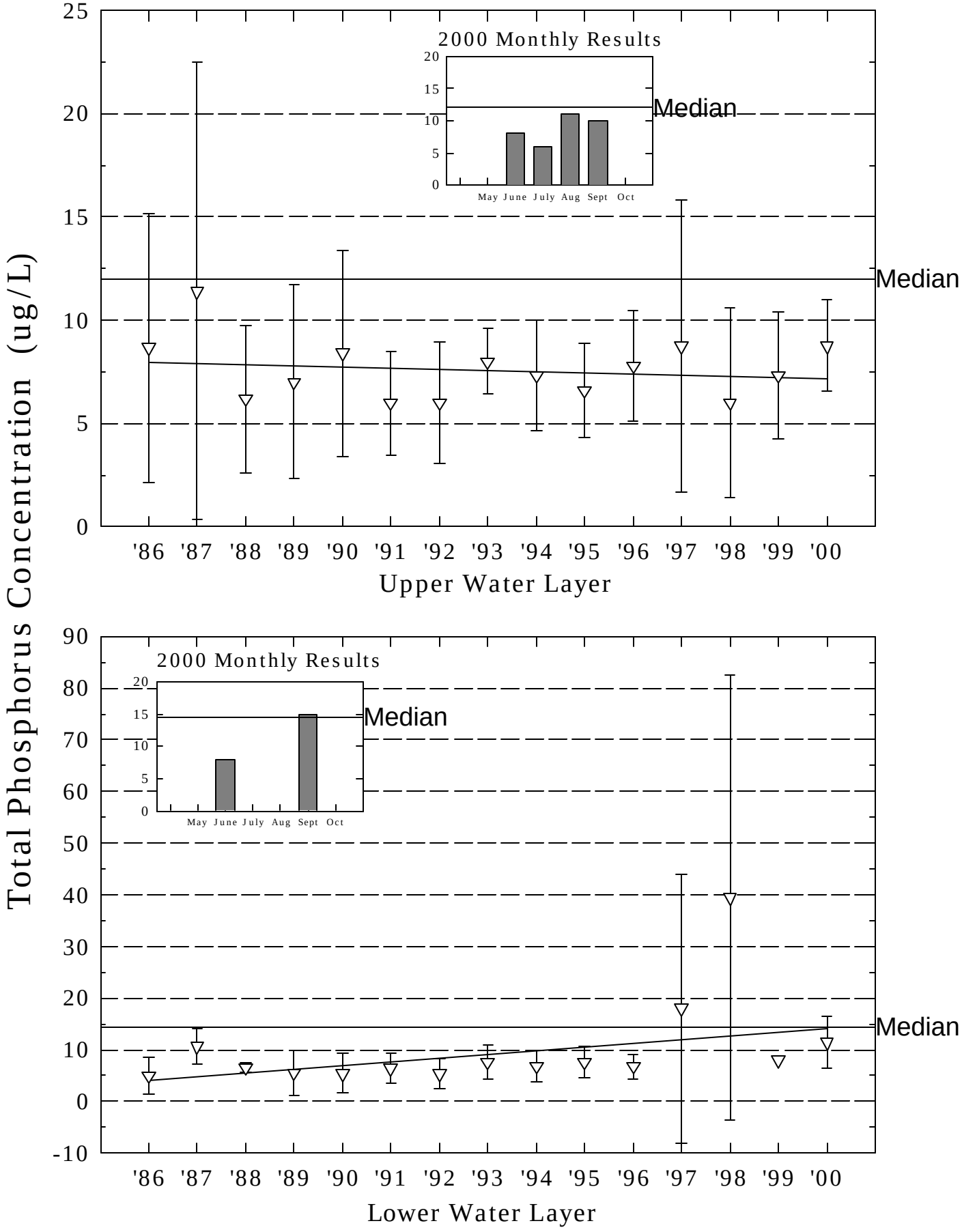


Table 1.

CHALK POND

NEWBURY

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1986	1.42	3.22	2.06
1987	2.10	6.25	3.49
1988	1.67	5.84	4.15
1989	0.91	2.92	2.01
1990	0.90	4.47	2.25
1991	0.95	7.80	2.78
1992	1.07	3.13	2.00
1993	1.08	5.48	3.07
1994	0.57	8.23	3.78
1995	1.47	8.58	5.46
1996	0.74	6.90	3.06
1997	0.57	3.46	1.64
1998	3.32	8.67	6.01
1999	1.80	7.58	4.62
2000	5.24	17.80	11.17

Table 2.

CHALK POND

NEWBURY

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
08 / 14 / 1986	MICRASTERIAS	35
	UROGLENOPSIS	35
07 / 06 / 1987	PERIDINIUM	64
	MICRASTERIAS	28
07 / 21 / 1988	UROGLENOPSIS	48
07 / 22 / 1991	MICRASTERIAS	34
	FILAMENTOUS BLUE-GREEN	30
	CHRYSOSPHAERELLA	17
07 / 02 / 1992	MICRASTERIAS	35
	PLUEROSIGMA	24
07 / 27 / 1993	STAURASTRUM	81
07 / 29 / 1994	CHRYSOSPHAERELLA	82
07 / 25 / 1995	CHRYSOSPHAERELLA	91
	STAURASTRUM	5
	PERIDINIUM	3
07 / 09 / 1996	PERIDINIUM	59
	STAURASTRUM	24
	MELOSIRA	5
07 / 28 / 1997	STAURASTRUM	53
	GYMNODINIUM	36
	PERIDINIUM	3
08 / 24 / 1998	PERIDINIUM	76
	STAURASTRUM	12
	CHRYSOSPHAERELLA	9

Table 3.

CHALK POND

NEWBURY

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1986	3.5	3.5	3.5
1987	3.5	4.0	3.7
1988	3.5	3.8	3.6
1989	3.5	4.0	3.7
1990	3.1	4.5	3.7
1991	3.1	4.3	3.4
1992	3.3	4.2	3.5
1993	3.1	3.6	3.3
1994	3.0	3.7	3.4
1995	3.2	3.7	3.4
1996	3.3	3.5	3.3
1997	3.0	3.6	3.3
1998	3.1	3.4	3.2
1999	2.7	3.2	2.9
2000	0.5	3.0	1.7

Table 4.

CHALK POND

NEWBURY

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1986	6.28	6.71	6.44
	1987	5.91	6.60	6.29
	1988	6.20	6.57	6.35
	1989	5.99	6.79	6.38
	1990	6.14	6.56	6.31
	1991	6.36	6.71	6.51
	1992	6.10	6.76	6.38
	1993	6.19	6.71	6.42
	1994	6.00	6.59	6.31
	1995	6.16	6.97	6.57
	1996	5.81	6.68	6.18
	1997	6.07	6.53	6.29
	1998	6.10	6.66	6.29
	1999	6.41	7.10	6.57
	2000	6.55	6.84	6.66
HYPOLIMNION				
	1986	6.28	6.53	6.40
	1987	5.88	6.85	6.33
	1988	6.20	6.57	6.39
	1989	5.85	6.83	6.19
	1990	5.99	6.68	6.25
	1991	6.32	6.86	6.49
	1992	6.02	6.99	6.34

Table 4.

CHALK POND

NEWBURY

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
	1993	6.23	6.78	6.48
	1994	6.09	6.66	6.33
	1995	6.16	7.32	6.48
	1996	5.80	6.26	6.05
	1997	6.05	6.48	6.28
	1998	6.32	6.68	6.42
	1999	7.35	7.35	7.35
	2000	6.01	6.48	6.19
INLET BEACH ROAD				
	2000	5.53	5.53	5.53
INLET HIGH ROAD				
	2000	5.60	5.60	5.60
INLET				
	1986	5.66	6.53	5.92
	1987	5.58	6.75	5.91
	1988	5.72	6.66	6.16
	1989	5.27	7.11	5.66
	1990	5.53	7.11	6.02
	1991	5.56	7.74	6.20
	1992	5.53	6.84	6.03
	1993	6.03	7.14	6.50
	1994	5.43	6.88	5.92
	1995	5.82	6.90	6.22
	1996	5.35	6.64	5.81

Table 4.

CHALK POND

NEWBURY

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
	1997	6.80	7.05	6.91
	1998	5.96	6.49	6.21
	1999	5.77	6.84	6.25
	2000	5.80	6.43	5.97
METALIMNION				
	1999	6.36	6.36	6.36
OUTLET				
	1986	6.33	6.57	6.42
	1987	5.93	6.70	6.29
	1988	6.12	6.51	6.30
	1989	5.79	6.78	6.19
	1990	5.99	6.53	6.25
	1991	6.14	6.80	6.43
	1992	5.99	6.65	6.29
	1993	6.23	6.81	6.45
	1994	5.93	6.72	6.27
	1995	6.36	6.68	6.51
	1996	5.80	6.50	6.13
	1997	6.34	6.58	6.44
	1998	6.34	6.69	6.48
	1999	6.17	6.77	6.43
	2000	6.27	6.45	6.38

Table 5.

CHALK POND

NEWBURY

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1986	1.80	1.80	1.80
1987	1.80	1.80	1.80
1988	2.60	2.90	2.77
1989	1.90	4.00	3.26
1990	1.60	2.80	2.20
1991	1.50	3.50	2.67
1992	2.10	3.60	2.92
1993	1.60	2.70	2.30
1994	1.60	3.00	2.19
1995	2.20	4.70	3.60
1996	1.40	3.10	2.20
1997	1.30	2.40	1.80
1998	2.50	3.50	3.00
1999	1.90	2.60	2.25
2000	1.80	3.50	2.70

Table 6.

CHALK POND

NEWBURY

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1986	34.7	37.0	35.9
	1987	30.1	78.9	40.6
	1988	29.5	31.4	30.7
	1989	30.5	36.0	34.1
	1990	30.7	35.5	33.5
	1991	29.9	36.6	32.5
	1992	31.6	35.2	33.6
	1993	28.2	35.5	31.4
	1994	32.0	37.4	35.0
	1995	31.9	35.8	33.9
	1996	29.4	35.9	33.2
	1997	36.7	43.7	40.6
	1998	39.6	45.3	43.3
	1999	43.2	48.2	46.3
	2000	49.9	51.8	51.0
HYPOLIMNION				
	1986	34.1	37.4	35.8
	1987	30.6	41.4	34.1
	1988	29.2	31.5	30.6
	1989	30.5	35.8	33.8
	1990	30.7	35.5	33.1
	1991	30.4	33.8	31.9
	1992	30.7	35.1	33.6

Table 6.

CHALK POND

NEWBURY

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
	1993	28.5	34.7	31.5
	1994	31.4	37.5	34.5
	1995	32.4	35.5	34.0
	1996	29.2	36.2	33.3
	1997	36.7	43.2	40.3
	1998	38.5	45.9	43.1
	1999	45.9	45.9	45.9
	2000	49.9	51.7	50.8
INLET BEACH ROAD				
	2000	20.3	20.3	20.3
INLET HIGH ROAD				
	2000	31.0	31.0	31.0
INLET				
	1986	20.9	25.3	23.4
	1987	19.0	28.1	22.0
	1988	19.4	31.4	25.0
	1989	20.3	29.2	24.3
	1990	20.4	38.4	28.1
	1991	19.8	107.4	40.8
	1992	20.4	27.9	24.3
	1993	18.9	32.4	25.9
	1994	19.7	28.7	23.2
	1995	20.3	29.5	25.4
	1996	19.0	30.9	23.5

Table 6.

CHALK POND
NEWBURY

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
	1997	17.9	31.8	24.9
	1998	17.6	235.0	91.2
	1999	19.3	34.2	26.9
	2000	19.6	24.7	21.2
METALIMNION				
	1999	48.2	48.2	48.2
OUTLET				
	1986	34.1	37.4	35.8
	1987	30.3	34.2	33.0
	1988	29.7	32.1	30.6
	1989	31.5	36.7	34.1
	1990	31.6	38.1	34.5
	1991	30.3	38.5	33.0
	1992	33.3	35.1	34.1
	1993	20.0	35.0	30.0
	1994	31.6	38.4	35.5
	1995	33.2	36.6	34.7
	1996	33.1	35.9	34.3
	1997	37.0	43.3	40.4
	1998	45.1	46.2	45.6
	1999	43.2	48.5	46.4
	2000	24.6	52.3	44.7

Table 8.

CHALK POND

NEWBURY

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1986	2	15	8
	1987	5	31	10
	1988	3	12	6
	1989	2	11	7
	1990	1	21	10
	1991	1	9	6
	1992	1	8	6
	1993	6	10	7
	1994	3	11	7
	1995	3	9	6
	1996	5	11	7
	1997	3	19	8
	1998	1	10	6
	1999	4	10	7
	2000	6	11	8
HYPOLIMNION				
	1986	1	8	5
	1987	6	14	10
	1988	6	8	6
	1989	3	12	6
	1990	1	13	6
	1991	1	10	6
	1992	1	8	5

Table 8.

CHALK POND

NEWBURY

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
	1993	2	11	7
	1994	2	11	6
	1995	4	12	7
	1996	4	10	6
	1997	3	48	18
	1998	9	70	39
	1999	8	8	8
	2000	8	15	11
INLET				
	1986	1	7	5
	1987	1	27	8
	1988	1	10	5
	1989	3	9	5
	1990	1	34	10
	1991	1	12	4
	1992	2	7	4
	1993	1	18	8
	1994	1	11	5
	1995	3	13	6
	1996	1	12	5
	1997	5	6	5
	1998	11	11	11
	1999	4	6	5
	2000	8	57	33

Table 8.

CHALK POND

NEWBURY

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
OUTLET				
	1986	1	9	5
	1987	4	17	8
	1988	2	9	5
	1989	2	22	8
	1990	1	21	8
	1991	1	10	5
	1992	2	19	7
	1993	3	22	9
	1994	1	17	9
	1995	3	13	7
	1996	3	11	7
	1997	2	10	5
	1998	3	7	5
	1999	6	15	10
	2000	5	12	8

Table 10.

CHALK POND

NEWBURY

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 1, 1986	3.5	19.9	8.8	94.0
July 6, 1987	3.5	20.0	8.9	95.0
July 21, 1988	3.0	24.0	7.7	90.0
July 3, 1990	3.5	21.0	7.3	82.4
July 22, 1991	3.5	25.8	7.5	92.3
July 2, 1992	3.0	21.0	9.7	109.5
July 27, 1993	3.0	20.7	7.2	79.0
July 29, 1994	3.0	22.0	7.2	82.0
July 25, 1995	3.0	23.6	8.0	93.0
July 9, 1996	3.0	22.5	9.5	108.0
July 28, 1997	3.0	23.0	8.7	100.0
August 24, 1998	3.0	21.3	8.0	90.0

Table 11.

CHALK POND

NEWBURY

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1997	0.2	0.6	0.4
	1998	0.5	0.8	0.6
	1999	1.0	1.6	1.3
	2000	0.9	2.3	1.6
HYPOLIMNION				
	1997	0.2	0.6	0.3
	1998	0.6	1.8	1.1
	1999	1.1	1.1	1.1
	2000	0.8	2.6	1.7
INLET BEACH ROAD				
	2000	0.6	0.6	0.6
INLET HIGH ROAD				
	2000	0.4	0.4	0.4
INLET				
	1997	0.5	1.0	0.7
	1998	0.8	2.3	1.3
	1999	0.9	3.6	1.9
	2000	0.5	2.2	1.2
METALIMNION				
	1999	0.9	0.9	0.9
OUTLET				
	1997	0.3	0.8	0.5
	1998	0.6	1.3	0.9
	1999	0.8	1.6	1.2

Table 11.

CHALK POND

NEWBURY

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
	2000	1.0	2.3	1.5

Table 12.

CHALK POND

NEWBURY

Summary of current year bacteria sampling.
Results in counts per 100ml.

Location	Date	E. Coli See Note Below
MAIN BEACH		
	June 26	6
	July 17	6
	August 22	2
	September 18	4
ROAD		
	August 22	1
SOUTH BEACH		
	July 17	6
	August 22	2
	September 18	1
WEST BEACH		
	July 17	5

NOTE: "<" means "less than" and ">" means "greater than"